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Through A Wintery Glass Dimly

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Winter Flying | by Rick Wheldon

As the winter months approach, a review of winter flying practices is useful so that the unique conditions found during the winter months need not detract from the safe operation of your aircraft. Winter flight has always presented challenges – the key to successfully navigating these challenges is to understand the effects of snow, ice, low ceilings, cold temperatures, and other environment factors on your aircraft and to take steps to mitigate them.

Mitsubishi Heavy Industries, Ltd. (MHI) has issued a number of documents that offer guidance on winter operations. Service News 139 and 093/30-014 was distributed in 2001, and described how one Canadian operator "winterized" his fleet of MU-2 aircraft to optimize reliability. Since lubrication is such an essential ingredient to the dependable operation of the MU-2, especially with the landing gear and flap systems, the Service News offered tips on lubrication techniques, which ensured that the various systems operated in their intended manner. Often, because of the extreme cold, the operator would lubricate at more frequent intervals than was required by the Maintenance Requirements Manual, and would use specific techniques which would thoroughly and evenly distribute fresh grease over the entire range of travel of the various jackscrews and torque tubes. Operators in northern climates would benefit from a review of this Service News.

Rubber components may become brittle in extreme cold conditions, so it would be wise for any operator to carefully inspect hoses, clamps, hydraulic fittings and seals for leaks or deterioration prior to the winter onset and regularly during winter. Suspect components should be replaced. Also, although control cable tensions are normally checked every 600 hours or 3 years, extreme cold could affect tensions, and a recheck might be warranted at winter onset. Finally, it wouldn't hurt to drain the static system to ensure that there has been no water buildup.

Preflight inspections are especially important during the winter, and a natural human tendency is to hurry through the preflight because of the extreme cold conditions. In fact, more time should be spent on the winter preflight than would be required in more moderate conditions. One technique to counteract the tendency to give short shrift to the winter preflight is to dress as if you were going to be marooned outdoors. This, of course, has the additional benefit of ensuring that you are dressed for emergencies which might, in fact, maroon you.

Rick Wheldon has over twenty-four years of aviation experience. He was the former manager of the demo fleet for Mitsubishi and an airline pilot with international experience flying with Braniff and Pan American. Rick holds an ATP and has accumulated over 7500 hours of flying time.

For example, one non-MU-2 operator had a landing incident which disabled his aircraft at the end of the runway in a heavy snowstorm at a non-towered airport. Heavy clothing was necessary just to walk from the aircraft to the FBO.

Batteries and engine oil can both disable any aircraft which has been left outdoors for extended periods. Batteries lose cranking power, and engine oil becomes extremely thick, both of which may act to prevent the starting of an engine. Battery blankets and engine pre-heaters are one solution – heated hangars are better. Some operators remove the batteries and store them indoors.

Condensation of water in the fuel tanks is more likely during the cold winter months. However, since water is more soluble in jet fuel than in avgas, draining the sumps in a turbine powered aircraft is best accomplished only after that airplane has been motionless for several hours, so that the water has had ample time to separate from the jet fuel. Otherwise, any water suspended in the jet fuel may not be apparent. Obviously, it is wise to ensure that any fuel added is clean and filtered. Many operators store their aircraft with the tanks full to minimize condensation.

Check for mud, slush, or other frozen accumulations in wheel wells and on brakes and gear. Also, strictly adhere to the clean aircraft concept. Even a thin layer of ice, frost or snow sticking to the wing or airframe can have catastrophic effects. The most effective means

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of detecting airframe ice are your hands and eyes. Frost may form when the fuel has cold soaked and the ambient air is humid and cool. Dry snow may be removed with a broom or brush, but frozen snow, ice or frost should be removed with an appropriate deicing fluid, or a hangar "warm-up." Caution should be taken upon removing the aircraft from a heated hanger. The skin of the aircraft should be allowed to cool prior to moving the aircraft into falling snow conditions. The snow, when it falls onto a warm aircraft skin, will melt and then re-freeze within a few minutes to form contamination on the surface that cannot be easily removed.

Not often recognized is the fact that water or blowing snow can collect in hidden cracks or crevices and then freeze. Reports have been received of ice forming in the spoiler wells of MU-2 aircraft which restrict the free movement of the spoilers. This ice will not be visible with a cursory inspection of the top of the wings. Fortunately, ice in the spoiler wells will be detected by the normal control checks during taxi out. Other areas where water/ice may accumulate include pitot tubes, heater ports, fuel vents, and elevator and trim tab controls and hinges.

TPE-331 engines should be operated on the ground with the engine heat ON in icing conditions (10°C or below with visible moisture for all engines except for the TPE331-25AA or AB). Ensure that the oil filter bypass valve bypass indicator is not popped. Perform a thorough preflight inspection of all anti-ice and de-ice systems per the Airplane Flight Manual prior to taxi. To preflight the wing de-ice boots, an outside observer must be positioned so that boot inflation on all boots can be verified after engine start. A thorough safety brief should be conducted between the observer and the pilot prior to engine start, since the engines are running during the check.

Winter taxi operations present unique challenges, primarily due to ice, winds, low visibilities, or a combination of all three. Do not taxi through small snowdrifts since there may be ice underneath. Braking action may be poor or nil, so keep taxi speeds to a crawl. Expect the airplane to slide sideways in a crosswind. One operator recommends keeping a cloth handy for de-misting the inside of windows while taxiing. When starting in extreme cold conditions, allow the gyros to spin up for a few minutes to heat the bearing mechanisms. Premature movement can wear the bearings at a higher than normal rate.

Aircraft takeoff performance is seriously compromised if there is snow, slush, or wet mud on the runway. Do not expect the aircraft to perform according to "book" specifications in these conditions, since the MU-2 has no data for takeoff with degraded runway conditions. For takeoffs in icing conditions, always turn the IGNITION switch to CONT (continuous) or ON.

Once you are airborne, keep

in mind that the most likely range for airframe icing is 0°C to -10°C. Ice seldom will form at temperatures below -20°C. Ice is most always encountered within a 3000 foot altitude range or less, so a small altitude change made early will pay great dividends in avoiding icing. It is worthwhile to note the freezing level during the preflight brief. Will terrain obstruct a descent to below the freezing level? If so, your only option may be to climb. In that case, do you have enough power reserve to climb through the icing range to colder temperatures above, while maintaining minimum airspeed in icing conditions? These questions should be answered before takeoff.

Operators should exercise caution during extreme cold operations since their altimeters may read higher than the actual aircraft altitude by several hundred feet. Canadian and Alaskan operators routinely make corrections to their minimum descent altitudes based on tabular cold temperature data.

Blowing snow or ice fog are two weather phenomena which may occur suddenly and unexpectedly. Both occur very close to the ground, usually within 50 feet or so, and a prudent pilot should keep alternate landing sites available. Blowing snow can be anticipated if rising winds are forecast with loose snow present, while ice fog is usually found on calm days near urban areas with temperatures below -30°F.

When approaching an airfield for landing, often it is wise to circle the runway, looking for snow banks, poorly marked runways, or other obstacles. Note the winds, and try to determine the runway condition, if possible. While the MU-2 is regarded as a good airplane for slick runway operations, any airplane landing on glaze ice is in a precarious situation, and it might be prudent to continue on to an alternate with a runway in better condition. Glaze ice, or "black ice" may not be readily apparent.

If any ice remains on the airframe prior to landing, increase the landing airspeed by at least 15 knots. Note that this will increase touchdown speeds on a potentially slippery runway, so care must be taken to maintain directional control. Use ground idle, then reverse thrust and light braking so as not to lock the wheels. Do not attempt to "grease" the landing. A firm touchdown will provide minimum stopping distance. As in the takeoff scenario, be aware that there are no data for landing distances on contaminated runways, so the need for extra margins must be anticipated.

Finally, once back on the ground, don't forget to install pitot and engine covers, control locks, and, if parking outside, tiedowns, or make arrangements for hangar storage.

Winter operations present unique challenges. Careful preparation is essential to safely overcoming these various challenges. While some element of risk is inherent in winter operations, it is entirely manageable for a well prepared pilot. Never forget that, if you are uncomfortable with any of these risk factors, the prudent decision may be a decision not to go in the first place.

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Black Ice
(from Wikipedia)

Black ice, also known as "glare ice" or "clear ice", typically refers to a thin coating of glazed ice on a runway or taxiway (or roadway). While not truly black, it is transparent, allowing the usually-black asphalt runway to be seen through it, hence the term. It is unusually slick compared to other forms of runway ice.

It is usually deposited by extremely cold rain droplets, mist, or fog. The process of freezing is slowed down due to latent heat given off in sublimation, allowing the rain droplets to flow and merge together on the surface forming a film before freezing into clear ice.

Nevertheless, because it contains relatively little entrapped air in the form of bubbles, black ice is transparent, and thus, very difficult to see (as compared to snow, frozen slush, rime ice, or other typical forms of ice on runways). In addition, it often has a matte appearance rather than the expected gloss; and often is interleaved with wet pavement, which is identical in appearance. For this reason, it is especially hazardous, because it is both hard to see and extremely slick.

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